slowing down of the French nuclear program. No decision will be taken until the beginning of next year.

It has long been recognized that there are strong opponents of nuclear power in the French Socialist government. The Communist Party, on the other hand, is in favor of nuclear power — not least for the employment opportunities that it offers. Approximately 200,000 people are directly engaged and about one million if ancillary activities are counted.

Apart from the slowdown in energy consumption, the financial stringency measures being taken by the Socialist government lend support to the possible cutbacks in high cost nuclear power construction. A third reason lies in the financial deficits of Electricite de France (EdF). It is no secret that the French franc devaluations have increased EdF's financial burden in the servicing of its substantial medium and long-term borrowings abroad. In addition, EdF has not been allowed for some time to apply the rate increases it has sought. A cutback in nuclear plant orders would be quite a relief to EdF.

If France's nuclear power construction program is slowed, the economic effects could be substantial. For example, Framatome, the French reactor supplier, would be severely affected. To reduce the rate of nuclear plant ordering from 2½ units per year to 1½ units would mean an effective reduction of 40 percent in Framatome's domestic business. Also, non-French suppliers would be affected. It is not clear what effect such a move would have on France's numerous uranium interests in Africa, Canada, Australia and the US, but it is clear that France's national uranium requirements would not rise as rapidly as presently expected.

* * *

On September 30, official authorization was given for two 1275 MWe reactors to be built at Nogent-Sur-Seine in the Aube Department. Onstream dates are planned to be 1987-88.

On October 11, official authorization was given for the construction of Chinon B3 and B4, two 925 MWe PWRs in the Indre and Loire Department. Onstream date is expected to be 1986.

* * *

In 1981, EdF's average capacity figure was 63 percent. In 1980, it was 69.6 percent. In August of this year, it was 44 percent (49 percent in June and 50 percent in July). Although the summer is the traditional period for programmed shut-downs, there have been a large number of small incidents necessitating shutdowns — in August, at Fessenheim 1 and Bugey 2. It is likely, therefore, that for 1982, EdF's capacity factor will be below the world average of 60 percent.

* * *

In **Spain**, the socialists' recent election victory may jeopardize the country's present nuclear program. The socialists' leader, Felipe Gonzalez, made the Lemoniz nuclear unit a prominent target in his campaign. The controversy over management of Lemoniz was thought to have been resolved by governmental agreement to accept most of the responsibility for the unit's safe construction and operation. However, during the campaign, Gonzalez called for a regional referendum on the Lemoniz station. His reopening of the issue casts serious doubts on the future of the plant.

The socialists' plans call for reducing the present construction plan by more than 4,000 MWe. Various pretexts are being cited as the basis for the proposed cutbacks; among them are reduced load growth forecasts and vulnerability to flooding. Socialist plans also call for switching all planned nuclear units to coal-fired plants instead.

The ultimate result is not yet clear. However, the Spanish utilities, led by their industry association, Unesa, have reacted strongly against the socialists' announced plans. Their principal arguments have been:

1. Nuclear power is safe and costs less than other forms of energy.
2. The socialists are manipulating energy use forecasts for their own political reasons.
3. To cut the nuclear construction program would threaten 20,000 jobs.

FAR EAST

The **People's Republic of China**, Canton Electric and China Light and Power have made a "decision in principle" to proceed with the Canton-Hong Kong nuclear power project. Although decisions have not been made as to the supplier or form of purchase and project organization, a site has been selected approximately 40 miles north of Hong Kong. Two 900 MWe units are to be constructed. Cost is estimated at approximately $4 billion. Completion of the first unit will probably be in the early 1990s, with the second to follow a year or two later.

© NUEXCO 1982

NUEXCO

MARKET ACTIVITIES

China Light and Power will purchase 40 percent of the output for its Hong Kong customers. Ownership will be 95 percent PRC and 5 percent China Light and Power. China Light and Power reduced its planned equity participation from the former 40 percent because of various political uncertainties. Both the PRC and China Light and Power believe the latter should have at least a token equity interest so the people of Hong Kong will be involved in the project.

The preferred plan of organization is a UK turbine generator, a Westinghouse nuclear steam supply system (NSSS) and an American architect-engineer (A-E). However, this plan is fading because of slow progress in negotiations for a bilateral safeguards agreement with the US. Those negotiations were proceeding well for a time, but have recently slowed. Although the Chinese hope the situation will improve after the US elections in November, they are becoming increasingly discouraged with prospects for a bilateral agreement with the US. Failing that, a French vendor may be the only practical alternative. That outcome appears to be the most likely, even if it is not the preferred one.

A major problem is resolution of the project management organization. The PRC wants to handle project management, or be deeply involved in some way, even though the project may cost more as a result. The aim is to gain experience for use on subsequent projects. The UK is pushing to provide essentially a turnkey plant with a Westinghouse NSSS. The French are pressing to provide a turnkey plant and a comprehensive fuel supply plan including enriched uranium. Neither project approach is desired by the PRC. The grand plan of the PRC is to build ten large plants of approximately 1,000 MWe each and ten of approximately 300 MWe each. The large plants would be LWRs; the smaller ones would use the indigenous design being developed by the PRC.

* * *

Japan's Agency of Natural Resources and Energy (ANRE) has published its preliminary estimates of comparative costs for construction and electricity generation using different energy sources. The estimates, for power plants commencing operations in 1982, have been converted from yen to US dollars and are summarized in Table 4.

Table 4

ANRE ESTIMATED COMPARATIVE COSTS FOR ELECTRICITY GENERATION

Energy Source	Construction Cost ($ per KWe)	Generation Cost (mills per KWh)
Oil	485	75
LNG	635	71
Coal	745	56
Nuclear	1,010	45

The absolute values of the figures presented in Table 4 are much less important than their relative values. The most important conclusion to be drawn from the data is:

In a country where societal and political objections are resolved in a civilized fashion, it is possible to realize the potential economic benefits of nuclear power. Even though nuclear's unit cost of construction is the highest of the four sources listed, its unit cost of generation is 20 percent below that of coal, the next lowest generating cost.

Why the clear advantage to nuclear power in Japan, when cost comparisons in the US are not nearly so decisive? Because the construction cycle in Japan averages five or six years. That allows utilities in Japan to predict and control their interest costs.

An example of the way things are done in Japan might illustrate the point. The second public hearing for TEPCO's Kashiwazaki Units 2 and 3, initially scheduled for September, will be delayed until sometime after November of this year, due to "disturbance by opposition parties." However, the delay in the second hearing will not be allowed to affect the planned construction schedule. The two 1,100 MWe units are scheduled for commercial operations in 1989.

In September, the EPRDCC formally approved the construction of Kyushu Electric Power Company's Genkai Units 3 and 4, two 1,180 MWe PWRs. Construction is scheduled to begin in 1984, for commercial operations in 1990 and 1991.

Unfortunately, Japan is not immune from declining electrical load growth forecasts. TEPCO is now considering whether to delay by 6-12 months the commercial operating dates for Kashiwazaki Unit 1 (now scheduled for 1985) and Fukushima Units 3 and 4 (1985 and 1986).

© NUEXCO 1982

One more piece of good news, however. The plant availability of all operating nuclear units in Japan — 24 units accounting for 17,177 gross MWe — for the first half (April 1 to September 30) of the current fiscal year has established a record of 73.6 percent. Given the required shutdowns for maintenance and inspections, a 75 percent availability is the maximum achievable. The record result looks especially good when compared against last year's 66 percent figure. Also, if Japan achieves the expected capacity factor for the second half of the fiscal year, this will be the third consecutive year above 60 percent. That trend compares favorably with 1981 results in the US (56.4 percent), France (57.8 percent) and West Germany (67.7 percent).

UNITED STATES

The only operating High Temperature Gas-cooled Reactor (HTGR) in the US received its full power operating license this month. Public Service Company of Colorado had been limited to operating the unit at 70 percent power for some time.

Kansas Gas and Electric announced that its Wolf Creek unit will be delayed by approximately one year. The utility's projected operating date is now the spring of 1985.

* * *

With the persistent decline in uranium prices, the closing of US production facilities and the withdrawal from the business of numerous US producers, there has been a sharp increase in the number of uranium properties being offered for sale. However, buyers are few in number and tend to be very selective in view of the wide range of opportunities available. Recent transactions are characterized by little or no cash, with future payments tied to future production, if any.

* * *

An event having the potential to affect the uranium market was the establishment this month of a mechanism enabling individuals to trade in uranium concentrates. The American Uranium Company, a subsidiary of Edlow International, is now offering certificates representing one hundred pounds of uranium concentrates which can be purchased and traded in a retail, cash, spot market in much the same manner as in a conventional commodity market.

Although it is too early to determine whether investors and speculators will be attracted and participate in sufficient numbers to develop a viable market, the subject has aroused much interest within the uranium community. It appears that the ultimate success of this venture will depend on developing a market of sufficient size and sophistication that producers and users will find it useful in their marketing and procurement activities, or in hedging their risks. If, for example, a producer could utilize the mechanism to insure a minimum level of profitability, or if the utility could use it to assure a ceiling on cost, then the system would likely have commercial application.

* * *

The much debated US uranium import embargo legislation is presently stalled pending the return of Congress in November. In the interim, the full spectrum of responses to the subject are being discussed. It appears that, as time passes, the predominant attitude toward the prospect of the enactment of the proposed embargo is becoming one of resignation. This development, of course, will probably have little or no effect on the outcome of the vote in Congress.

ENRICHED URANIUM AND SWU

DOE has begun the process of reviewing the comments received on the draft Facility Requirements (FR) contract and the responses to the questionnaires sent to all DOE customers during August. DOE is expected to complete their review after the new year, and then issue the final FR contract and, more importantly, the terms and conditions of converting existing DOE contracts to the new form.

Major criticisms of the new contract as proposed include:

1. The high termination charges that do not decrease with time;
2. The long lead time of 30 months required for assignments or substitutions of other DOE enriched material.

In addition, some DOE customers are dissatisfied with the FR contract concept completely and are requesting that DOE simply return to offering the requirements contract form.

DOE's actions with regard to the conversion of existing contracts are being watched very closely due to the dramatic effect a large scale conversion of AFC contracts to the FR form would have on the secondary

© NUEXCO 1982

NUEXCO

MARKET ACTIVITIES

SWU market. Nuexco's analysis of these effects will be published next month in Report 172.

In the meantime, the secondary SWU market remains quite active. There are a number of buyers still seeking secondary market supply for the DOE fiscal year ending September 30, 1983 (FY83), mainly requirements contract holders who have either already terminated deliveries or expressed willingness to do so if the discounts offered are attractive. In addition, there are some small buyers who are seeking excess SWUs above their requirements contract Appendix A commitments ceiling.

A number of high-discount sellers of FY83 DOE SWUs have recently sold out, so present discounts from the Adjustable Fixed Commitment (AFC) contract price available on the secondary market for FY83 have decreased somewhat. When calculated at 0.20 percent tails assay, the discount is approximately $25 per SWU. This discount is not sufficient to allow any requirements contracts holders who have not yet terminated for FY83 to do so economically.

Discounts available from the AFC price for FY84 remain in the range of approximately $27-$30 (when calculated at .2 tails), due mainly to the number of sellers who have elected (under the VTAO) the more attractive .3 tails for FY84 for selling purposes. However, many potential buyers are reluctant to commit now. Some prefer to wait until their actual requirements are better known; others hope to obtain an even larger discount next year from sellers desperate for cash.

Discounts available for FY85 are significantly less than they have been in recent months, due primarily to two factors.

1. One high-discount FY85 seller has sold out and withdrawn from the market.

2. Other sellers are reluctant to commit to a high discount before DOE announces the terms and conditions of conversion to the new FR contract. DOE has previously given an indication that excess commitments past FY86 may be allowed to be slipped upon conversion to the FR contract. Therefore, potential sellers for FY85 may be better off to simply buy and hold their excess FY85 commitments and slip future commitments until needed.

There are virtually no DOE SWU sellers for 1986 and future years. Again, potential sellers are awaiting DOE's terms and conditions for converting to the FR contract.

© NUEXCO 1982

URANIUM SUPPLY
(As of 10/31/82)

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U_3O_8) 0 to 1 Year	Beyond 1 Year	Remarks
Available for Sale:			
ACTIVE			
1575		500 per year	Long Term
1951	1,250		
1986	40		
2017		2,350	1984-86
2020		200 per year	1983-92
2027	1,000		
2038	1,500		UF6
2045	500		
TOTAL:	4,290		
INACTIVE			
1581B		100 per year	Long Term
1804	615		
1805		500 per year	Long Term
1818		250 per year	Long Term
1877	100		
1925	500		UF_6
1928	1,000		UF_6
TOTAL:	2,215		

[1] Measured from the date of this Report

© NUEXCO 1982

NUEXCO

MARKET DATA

URANIUM DEMAND
(As of 10/31/82)

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U_3O_8) 0 to 1 Year	Beyond 1 Year	Remarks
Inquiries to Purchase:			
ACTIVE			
1638		250 per year	1983-89
1871		250 per year	1983-86
1915		500	UF_6
1995	250		
1996		600	
2000	350	250	
2005		1,000	
2010		400 per year	1984-92
2014	160		
2023		200	
2030		1,350	1984-85
2031	1,000		UF_6
2032		200	
2033	300		UF_6
TOTAL:	2,060		
INACTIVE			
1459		200 per year	Long Term
1652		200 per year	Long Term
1843	250		
1888		500 per year	Long Term
1923	30		
1935		400	
1963		180	
1966	100	200	
1978	200	200	
1979	30	175 per year	1983-87
1999		50 per year	1985-90
2004	100		
2025		330	
TOTAL:	710		

[1] Measured from the date of this Report.

© NUEXCO 1982

CONVERSION SUPPLY
(As of 10/31/82)

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U as UF6) 0 to 1 Year	Beyond 1 Year	Remarks
ACTIVE			
1607	200		
1609	500	1,500 per year	Long Term
1936	1,000	200 per year	Long Term
TOTAL:	1,700		
INACTIVE			
1619	250	250	
1902		350	
1925	450		
2008	800	800	
TOTAL	1,500		

CONVERSION DEMAND
(As of 10/31/82)

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U as UF6) 0 to 1 Year	Beyond 1 Year	Remarks
ACTIVE			
1995	220		
2018	100		
TOTAL:	320		
INACTIVE			
1594	400	450 per year	Long Term
1622	250	700	
TOTAL:	650		

[1]Measured from the date of this Report.

© NUEXCO 1982

NUEXCO

MARKET DATA

LOAN SUPPLY AND DEMAND
(As of 10/31/82)

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U_3O_8) 0 to 1 Year	Beyond 1 Year	Remarks
Available for Loan:			
ACTIVE			
1815	1,000		
1919	1,000		
1938	2,000		
2006A	600		
2036	200		
TOTAL:	4,800		
INACTIVE			
1884	600		
1910	1,000		
1931	600		
2040	500		UF_6
TOTAL:	2,700		
Inquiries to Borrow:			
ACTIVE			
1998	200	200	
2006	600		
TOTAL:	800		
INACTIVE	None		

[1]Measured from the date of this Report

© NUEXCO 1982

CURRENT TRANSACTIONS[1]

Uranium Transactions

Nuexco Reference Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current E.V.	Seller	Buyer	Remarks
1978	1984-91	601-1000	Indeterminate	Canadian Producer	US Utility	Price related to market
1982	1982 or 83	101-300	97 (est.)	US Utility	European Utility	UF_6
1987	1982	Less than 50	95	US Producer	Broker	
1992	1982	Less than 50	100	US Producer	US Producer	
1993	1982-83	101-300	97	US Producer	Broker	
1994	1982	101-300	99	US Producer	US Producer	
2004	1982	50-100	98	US Producer	US Producer	
2005	1982	101-300	101	US Producer	Broker	
2011	1983	301-600	100 (est.)	Broker	European Utility	UF_6

Conversion Transactions

Nuexco Reference Number	Delivery Period	Approximate Quantity (thousands of pounds, U equivalent)	Approximate Price as Percent of Current C.V.	Seller	Buyer	Remarks

There are no conversion transactions reported this month.

Loan Transactions

Nuexco Reference Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current L.U.C.R.	Lender	Borrower	Remarks
1979	1982	301-600	100	US Utility	US Producer	

[1]Transactions listed are not limited to those in which Nuexco was involved, but also include others of which Nuexco is aware.

© NUEXCO 1982

NUEXCO

MARKET ANALYSIS

THE VARIABLE TAILS ASSAY OPTION: ITS SIGNIFICANCE TO THE SECONDARY SWU MARKET

Nuexco's brokerage experience indicates that the availability of the VTAO has encouraged the existence of an active secondary market in SWU. The VTAO has had the following commercial effects:

1. It has effectively reduced the economic penalty of selling SWU. Without the VTAO, some utilities having excess SWU commitments would decide simply to hold enriched uranium inventory. Having the option to vary their tails assay, those same utilities now find it economic to sell at the somewhat lower discounts necessary to complete a transaction at a higher tails assay.

2. It has enabled more utilities holding DOE requirements contracts to obtain the effective discounts necessary to economically terminate and buy replacement DOE SWU on the secondary market.

An example will illustrate the use of the VTAO to facilitate a secondary market SWU transaction:

1. Utility A, wishing to dispose of excess SWU commitments, has elected a tails assay for its fiscal year 1983 (FY83) deliveries of 0.28 w/o (weight percent) under the VTAO.

2. Utility B, holding a 3.5 year termination requirements contract, decides to partially terminate its minimum expected requirements for FY83 of 100,000 SWU and buy the replacement SWUs from Utility A. Utility B pays DOE a termination charge of $37.46 for each SWU terminated (25 percent of the requirements contract price, $149.85 per SWU).

3. Utility B, just to break even, must therefore receive an effective SWU price of $112.39 per SWU ($149.85-$37.46).

4. In order to have some incentive to complete the transaction, Utility B decides it needs an additional discount of $3 per SWU, or a price of $109.39.

5. Therefore, if Utility A were selling SWU at a tails assay of 0.20 w/o, Utility A would need to offer a discount of $29.26 off the Adjustable Fixed Commitment (AFC) price per SWU ($138.65-$109.39).

Since Utility A is offering 0.28 w/o tails rather than .2 tails, however, the discount offered will be significantly less than $29.26, depending on the enriched product assay Utility B wants, as well as the marginal cost of UF_6 feed. *Note that Utility B's historical cost of feed does not affect the calculation, only the marginal cost of buying additional feed (in place of SWU) on the open market.*

Assuming that Utility B wants an enriched product assay of 3.4 percent, and that the marginal cost of feed in the spot market is $48 per KgU, the discount offered by Utility A could be calculated as follows:

1. Calculate the amount of enriched product Utility B wants, as well as the quantity of SWUs and natural feed required at .2 tails.

100,000 SWU at .2 tails will produce 100,000/5.19 or 19,268 KgU as 3.4 percent enriched UF_6, and requires 19,268 × 6.26 or 120,618 KgU as natural UF_6 feed.

2. Calculate the quantity of SWUs and feed that would be required at .28 percent tails assay.

19,268 KgU at 3.4 percent enrichment with .28 tails requires 19,268 × 4.32 or 83,238 SWU and 19,268 × 7.24 = 139,500 KgU feed.

3. Calculate the cost of 19,268 KgU at 3.4 percent enrichment with .2 w/o TA.

100,000 SWU × $109.39 per SWU ($138.65-$29.26) + 120,618 KgU feed × feed price ($48 per KgU feed) = $16,728,664.00.

4. In order to calculate the SWU price (SP) at .28 TA that would be equivalent to a discount of $29.26 at .2 TA, set the cost of product at .2 TA equal to the cost of the *same amount* of product (19,268 KgU as UF_6) at .28 TA.

5. Thus, at .28 TA, the cost of 19,268 KgU as 3.4 percent enriched UF_6 would be calculated as

83,237 SWU × SP in $ per SWU + 139,500 KgU feed × feed price ($48 per KgU feed) = $16,728,664.00.

6. Thus, 83,238 × SP = $10,032,664, so SP = $120.53.

Solving for SP indicates that a price of $120.53 per SWU at .28 tails offered by Utility A will be effectively equivalent to a SWU price of $109.39 at .2 tails. So Utility A only would need to offer a discount of $138.65 – $120.53, or $18.12 per SWU to complete this transaction.

© NUEXCO 1982

URANIUM OCCURRENCES IN FINLAND

Introduction

The Finnish government initiated uranium exploration in the early 1950s. A modest effort, its purpose was to determine the country's potential uranium resources. A number of isolated occurrences were discovered within the first few years, and the government concluded that geological conditions throughout the country presented favorable potential for sufficient uranium resources to support a domestic nuclear power program. The exploration effort has continued through the years with limited success. Reasonably Assured Resources (RAR) in Finland presently are estimated at about 3200 tonnes U_3O_8 recoverable at US$50. Uranium is not now being produced in Finland.

The government made a policy decision to develop a nuclear power base for Finland in the late 1960s. The first nuclear power plant went into service in 1977. Finland now has four plants operating at a total capacity of 2160 Mw, accounting for almost 20 percent of the country's total electricity generation. A fifth nuclear plant, presently under consideration, could add another 1000 Mw to the power system by about 1991.

Finnish uranium requirements are presently about 860,000 pounds U_3O_8 per year, all supplied by foreign sources. The government is committed to establishing a domestic uranium industry to offset dependence on foreign uranium. The continuing uranium resource evaluation program may have to be accelerated if this commitment is to be accomplished.

Exploration History

The government has always controlled the evaluation of mineral resources in Finland. The mining law dictates that foreign groups are required to seek special permission from the Council of State to participate in the evaluation and exploitation process for any mineral resource. The Council has not granted such permission during the last 30 to 40 years. All activity has been delegated to the domestic mining industry.

The claiming of potential mineral lands and subsequent evaluation activity is under the jurisdiction of the Industry Department of the Ministry of Commerce & Industry. The Energy Department of the Ministry is assigned all energy-related projects including the availability of nuclear fuel from domestic sources.

The national uranium evaluation and exploitation program is in turn controlled by the Atomic Energy Commission which consists of varied internal agencies, led by the Uranium Exploration Advisory Board. Members of the Advisory Board are active representatives from the Ministry of Commerce & Industry, the Geological Survey, mining companies, and electric power companies.

The Atomic Energy Commission assigned the Geological Survey of Finland (GSF) the primary responsibility for uranium exploration. A staff of about 20 geologists, technicians and assistants carry out the assigned tasks with an annual budget of approximately US$375,000. All exploration programs begin with a preliminary geological investigation and mapping of a prospect area to establish rock type, structure and related geological characteristics favorable to uranium mineralization.

Glacial drift hinders exploration, especially in northern Finland. However, the problem is at least partially overcome by utilizing ground and airborne geophysical techniques to detect buried geological features which may be of interest. The GSF continues prospect evaluation with detailed geophysical and geochemical procedures plus trenching and drilling to obtain sufficient rock samples for assaying. Once a promising discovery has been made, the GSF may appoint a state-owned or private mining company to complete property evaluation and development. Commercial development of a property is carried out under the close jurisdiction of the Ministry of Commerce & Industry.

The GSF and national mining companies offer cash incentives to the general public for submitting information and rock samples that may lead to new prospects. The program has been extremely successful in the past as amateur prospectors annually submit 20,000 to 25,000 mineral samples for evaluation. If a sample contains interesting mineralization, the agencies follow up with a property examination. The cash reward is granted after prospect potential has been determined; the amount varies considerably depending on the value of the discovery. A sample with interesting mineralization will pay US$100 to 500; a sample which leads to detailed property evaluation and core drilling will be rewarded by US$500 to 4,000; if a commercial ore deposit is discovered, payment can increase to US$25,000, the highest amount yet paid to a prospector.

Success of the incentive program is verified by the fact that more than 60 percent of known ore deposits in Finland were discovered by amateur prospectors. The discovery ratio for uranium mineralization is less than 60 percent; nevertheless, the program has been impor-

© NUEXCO 1982

tant to the ongoing evaluation of Finland's uranium resources. The limited staff of the GSF is somewhat dependent on the amateur prospector to carry out the reconnaissance-type prospecting in the more remote areas of Finland.

General Geology

The geology of Finland consists almost entirely of Precambrian crystalline rocks of the Fennoskandian Shield complex. As in Sweden and Norway, the shield rocks of Finland consist of highly metamorphosed sediments, granites and volcanics which vary in age from 2800 to 1300 million years (m.y.). Probably the oldest rocks in Finland are the graphitic metasediments, quartz-banded iron formations and the carbonatite complex found in east-central Finland. The rocks are considered Archean in age and have been dated at plus 2800 m.y. old. Recrystallization of Archean rocks occurred during the Svecokarelian Orogeny, age dated at about 2000 to 1800 m.y.

The oldest rocks of Proterozoic Age are the quartzitic schiests of the Lower Jatulian Formation (2600 m.y.). The Lower Jatulian is in uncomformable contact with Archean rocks. Basal Jatulian deposition consisted of arkosic sandstones and conglomerates. The basal units were metamorphosed to quartzites and quartz conglomerates. Uranium mineralization occurs in association with the quartzitic zones near the contact with Archean basement rocks. The contact zone just described is probably the most favorable environment for the occurrence of uranium mineralization in Finland.

During the Svecokarelian Orogeny, the older rocks were intensely folded, metamorphosed and altered by numerous intrusions of quartz diorites and granites. A long period of erosion and alteration took place after the orogeny. Sediments and volcanic flows of Cambrian-Silurian age were deposited on the eroded surface. Younger formations were in turn deposited to build up a geologic sequence through the Cenezoic period. Each in turn was eroded away to leave the Proterozoic/Archean surface as it now occurs throughout Finland. The entire Fennoskandian Shield area has remained fairly stable since the end of the Svecokarelian Orogeny, and is masked only by glacial till which was deposited during the ice age.

Uranium Occurrences

The Reasonably Assured Resources (RAR) of Finland are found in at least five different geologic environments; additional uranium is found in five other rock-types. There are over 30 known occurrences widely scattered throughout the country. The most prolific environment is Precambrian rocks associated with the unconformity. Several of the important occurrences shown on Figure 1 are discussed below.

Perhaps the most notable uranium occurrences to be found in Finland was the Paukkajanvaara deposit located in the Eno district. The deposit was discovered by prospectors in the mid-1950s. The main mineralized zone was found by trenching and drilling in Lower Jatulian conglomerates and quartzites immediately above the unconformable contact with Archean rocks. Uranophane and pitchblende mineralization occurred as fracture and vein filling in a highly altered segment of the Precambrian rocks.

The government appointed a private mining company, Atomienergia Oy, to mine the ore and to establish a metallurgical process to recover the uranium. The company mined 31,000 tonnes ore by underground and open pit methods between 1958 and 1961. The ore averaged 0.14 percent U_3O_8 and about 80,000 pounds of uranium were recovered. The highest grade portion of the deposit was essentially mined out; no uranium mining and milling has taken place in Finland since 1961.

Exploration was stimulated by the discovery at Paukkajanvaara. Within a short time, mineralization had been discovered in four nearby prospects. The uranium always occurs in sheared, fractured and highly altered metasediments of Lower Jatulian rocks as at Riutta, or in Archean rocks as at Revonkyla. Each occurrence is closely associated with the unconformity, and generally has low uranium values.

There are two small deposits in the district that contain ore reserves—the Herajarvenkannas and Ipatti deposits in the Lieksa area. Pitchblende is found in Lower Jatulian quartzites and quartz-conglomerates in both deposits. The former contains about 20,000 tonnes ore at an average uranium content of 0.10% U_3O_8. (About 500 tonnes ore were mined from the deposit in 1960 and 1961 for metallurgical tests.) The latter contains reserves estimated at 70,000 tonnes averaging 0.09 percent U_3O_8. The deposits represent a combined RAR of about 80 tonnes U_3O_8.

Outokumpu Oy has discovered uranium mineralization at three locations on the Kittila greenstone belt in northwestern Finland. The most important is the Pahtavuoma deposit. Uranium is found in a host of fractured meca schists and phyllites which are part of the greenstone complex of Archean age. Uranium reserves

© NUEXCO 1982

have been estimated at 300,000 tonnes ore averaging 0.22 percent U_3O_8, representing about 600 tonnes U_3O_8. The main ore mineral is uraninite, occurring in association with copper and molybdenite minerals.

The source of mineralization is considered to be related to volcanism that occurred during late stage development of the greenstone complex. The uranium was present in Archean rocks, but not necessarily restricted to greenstones. It was at least partially recrystallized and remobilized through prolonged contact with migrating hydrothermal solutions during late Archean tectonics and the period of extensive metamorphism and alteration associated with the development of the unconformity at about 2600 m.y., and again during the Svecokarelian Orogeny at about 2000 to 1800 m.y. Uranium and any associated minerals precipitated as the solutions made contact with favorable host conditions. Most of the uranium deposits in Finland probably originated in this manner.

Two of the largest uranium occurrences known in the country are the Lampinsaari and Nuottijarvi deposits in central Finland. In both deposits, uranium occurs as a minor co-mineral with phosphate rock. The Lampinsaari deposit is in apatite-bearing carbonate rocks and apatite-quartz gneisses of the Jatulian Formation. The uranium content is low, averaging 0.04 percent U_3O_8. Ore reserves have been estimated at 2,500,000 tonnes; thus, the deposit contains about 1000 tonnes U_3O_8 which could be recovered as a by-product to phosphate.

The Nuottijarvi phosphate deposit occurs in a breccia zone within a Jatulian quartzite. The uranium occurs with apatite in association with quartz and feldspar. Ore reserves, including uranium, are the same as at Lampinsaari. The potential to recover the uranium is the same also.

Large, low grade (0.01 to 0.03 percent U_3O_8) uranium occurrences are known in Lower Jatulian black schists, Middle Jatulian siltstones and Archean carbonatites. The occurrences are scattered throughout the country and represent tens of millions of tonnes of rock containing large uranium resources. However, uranium recovery from these deposits depends upon favorable industry economics and a metallurgical breakthrough; otherwise, the occurrences are classified as Speculative Resources.

The uranium exploration program of Finland has been successful in proving favorability of the geology for uranium occurrences. It is recognized by the GSF that considerable potential exists for the discovery of economically important deposits in Finland.

© NUEXCO 1982

NUEXCO

RAW MATERIALS

Figure 1

URANIUM OCCURRENCES OF FINLAND
Numbered occurrences are described in text

© NUEXCO 1982

STATISTICAL DATA

EXCHANGE VALUE $17.50/lb. U_3O_8
Determined as of October 31, 1982

Definition[1]

The Exchange Value is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the last day of the month.

Derivation

Nuexco bases the Exchange Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Exchange Value:

A. The price of uranium delivered or to be delivered under old contracts.
B. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.

[1]In December, 1981, Nuexco published a history of the Exchange Value which chronicled, month-by-month, changes in its definition, usage and derivation. Copies are available upon request.

TRANSACTION VALUE[2]
Determined as of October 31, 1982

$/lb. U_3O_8	Millions of Pounds	Number of Transactions	Number of Months
17.00	3.6	20	3

Definition

The Transaction Value is a weighted average price of recent transactions, and is based on prices paid for U_3O_8 in transactions closed within the previous three-month period and for which delivery was scheduled within one year of the transaction date. At least ten transactions totaling at least two million pounds U_3O_8 are included in each calculation, or the sample time is extended as necessary to include these minima. Foreign currencies are converted to US dollars as of the transaction date.

[2]Transaction Values for 1976 through 1981 and their associated parameters (millions of pounds, number of transactions and number of months) are tabulated on pages 31 and 32 of Report 161.

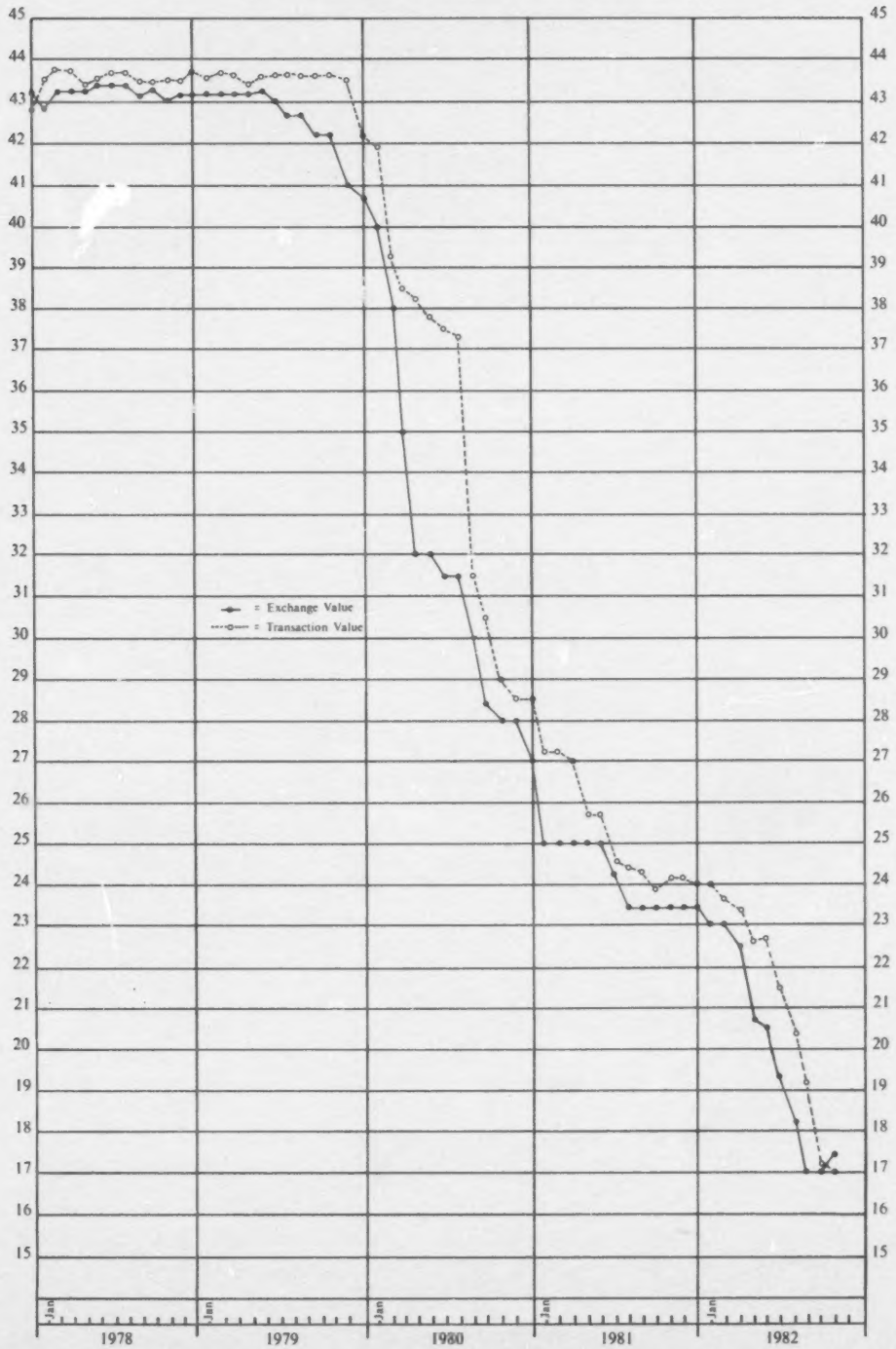
© NUEXCO 1982

NUEXCO

STATISTICAL DATA

EXCHANGE AND TRANSACTION VALUES SINCE JANUARY 1978

Determined as of the last day of the month indicated



© NUEXCO 1982

HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	**17.50**		

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	**17.00**		

EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country	per lb. U_3O_8 in Concentrates	per kg U_3O_8 in Concentrates	per kg U in Concentrates
US (dollar)	17.50	38.58	45.50
France (franc)	126.26	278.36	328.25
FRG (mark)	44.64	98.42	116.06
Japan (yen)	4,834	10,658	12,568
Switzerland (franc)	38.55	85.00	100.23
UK (pound)	10.40	22.92	27.03
Australia (dollar)	18.70	41.23	48.62
Canada (dollar)	21.45	47.30	55.78
Niger, Gabon (CFA)	6,318	13,928	16,425
South Africa (rand)	20.42	45.01	53.08
Sweden (kroner)	130.01	286.63	338.01

[1]Calculated using currency exchange rates published in the Wall Street Journal on the last business day of the month.

© NUEXCO 1982

NUEXCO

STATISTICAL DATA

CONVERSION VALUE $1.60/lb. U as UF_6
Determined as of October 31, 1982

Definition

The Conversion Value is Nuexco's judgment of the price at which spot and/or near term transactions for significant quantities of conversion services could be concluded in the secondary market as of the last day of the month.

Derivation

Nuexco bases the Conversion Value upon:
A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Conversion Value:
A. The price of conversion services delivered or to be delivered under old contracts.
B. The price of conversion services delivered in connection with contract renegotiations or other than arm's length transactions.

LOAN USE CHARGE RATE[1] 6%
Determined as of October 31, 1982

Definition

The Loan Use Charge Rate is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the last day of the month.

Derivation

Nuexco bases the Loan Use Charge Rate upon:
A. Data from recently completed or pending loan transactions.
B. Rates included in firm proposals to borrow or lend.
C. Rates that potential borrowers and lenders have expressed as a willingness to pay or accept, but for which Nuexco is not aware of firm proposals.

[1]Monthly data for 1968 through 1981 appear on pages 32-34 of Report 162.

© NUEXCO 1982

AUSTRALIAN GOVERNMENT STATISTICS

	Price Index of Materials Used in Manufacturing Industry—All Groups (Year 1968-69 = 100.0)[1]	Weighted Average Minimum Weekly Wage Rates—Adult Males Australia Mining and Quarrying (A$)[2]
Annual Avg. 1971[3]	101.5	65.95
Annual Avg. 1972[3]	105.6	71.26
Annual Avg. 1973[3]	124.4	78.96
Annual Avg. 1974[3]	141.9	108.07
Annual Avg. 1975[3]	150.4	132.55
Annual Avg. 1976[3]	168.4	160.93
Annual Avg. 1977[3]	192.0	179.03
Annual Avg. 1978[3]	198.5	190.04
Annual Avg. 1979	248.8	196.34
Annual Avg. 1980	321.8	218.00
Annual Avg. 1981	355.3	237.34
May 1981	353.4	237.31
Jun 1981	360.4	237.93
Jul 1981	356.9	237.86
Aug 1981	359.9	237.86
Sep 1981	357.4	238.00
Oct 1981	351.6	239.26
Nov 1981	351.3	241.31
Dec 1981	349.9	258.56
Jan 1982	354.9	261.58
Feb 1982	356.7	262.95
Mar 1982	360.3	263.12
Apr 1982	367.7R	262.99
May 1982	367.6R	263.24
Jun 1982	367.2R	264.19
Jul 1982	369.1P	268.20
Aug 1982	371.5P	

P = Preliminary R = Revised since last month

[1]Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0), Table 3.
[2]Australian Bureau of Statistics, Canberra: "Wage Rates, Australia" (Catalogue No. 6312.0), Table 1. Figures for the latest fourteen months shown are subject to revision.
[3]Monthly data for 1970 through 1978 appear on pages 4.7 and 4.8 of Nuexco Report 138.

© NUEXCO 1982

NUEXCO

STATISTICAL DATA

CANADIAN GOVERNMENT STATISTICS

	Industry Selling Price Index: Manufacturing (D 500000)[1] [2] (1971 = 100.0)	Wage-earner Data: Average Hourly Earnings (C$)[3] [4]		
		Metal Mining, including Milling (SIC 050-059)	Primary Metal Industries, non-ferrous (SIC 296-298)	Chemicals and Chemical Products (SIC 370-379)
Annual Avg. 1978	190.4	8.76	6.82	6.97
Annual Avg. 1979	217.9	9.60	7.35	7.67
Annual Avg. 1980	247.2	10.59	8.05	8.50
Annual Avg. 1981	272.3P	12.02	9.03	9.53
Aug 1981	276.2	11.83	9.15	9.63
Sep 1981	276.9	12.47	9.22	9.77
Oct 1981	279.3	12.78	9.35	9.91
Nov 1981	278.8	12.89	9.45	9.89
Dec 1981	280.0	12.87	9.42	10.03
Jan 1982	281.9	13.14	9.53	10.11
Feb 1982	283.5R	13.25	9.60	10.19
Mar 1982	284.7R	13.34	9.62	10.35
Apr 1982	287.5R	13.46	9.79	10.48
May 1982	288.9R	13.56R	9.88	10.62
Jun 1982	289.8	13.71R	9.92R	10.69P
Jul 1982	290.6R	13.64P	10.08P	10.71P
Aug 1982	290.2	—	—	—

P = Preliminary R = Revised since last month

[1]Statistics Canada, Prices Division, Ottawa; "Industry Price Indexes" (Catalogue 62-011), Table 1. Indexes for the most recent six months shown are subject to revision.

[2]Monthly data for 1973 through 1978 appear on page 4.10 of Nuexco Report 138.

[3]Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa; "Employment, Earnings and Hours" (Catalogue 72-002), Table 2.

[4]Monthly data for 1977 and 1978 appear on page 4.11 of Nuexco Report 138.

© NUEXCO 1982

REPUBLIC OF SOUTH AFRICA STATISTICS

	Average Declared Working Costs per Metric Ton of Gold Ore Milled (Rand)[1]	Consumer Price Index[2] (1975 = 100, except where otherwise indicated)	Producer[5] Price Index All Groups (1975 = 100)	Total Employment in Mining and Quarrying (Code 35)[7]	Total Salaries and Wages in Mining and Quarrying (1,000 Rand) (Code 40)[7]
Annual Avg. 1971[3]	7.88	106.4[4]	59.1	652,294	415,956
Annual Avg. 1972[3]	8.79	113.3[4]	63.9	623,067	443,933
Annual Avg. 1973[3]	10.51	124.1[4]	72.3	684,743	572,133
Annual Avg. 1974[3]	13.18	138.5[4]	85.3	674,140	761,596
Annual Avg. 1975[3]	16.71	157.2[4]	100.0	639,473	1,003,617
Annual Avg. 1976[3]	19.30	174.7[4]	115.1	671,240	1,212,983
Annual Avg. 1977[3] [6]	23.87	194.4[4]	130.0	712,006	1,420,670
Annual Avg. 1978[3] [6]	27.14	137.2	142.7	664,571	1,537,169
Annual Avg. 1979[3] [6]	30.18	155.3	164.5	692,209	1,830,632
Annual Avg. 1980[6]	35.53	176.7	192.1	714,379	2,279,615
Annual Avg. 1981	41.89	203.5	218.3	728,506	2,820,505
Apr 1981	—	196.4	211.6	719,674	217,124
May 1981	—	197.7	213.2	726,869	219,880
Jun 1981	40.41	200.0	215.3	728,506	237,049
Jul 1981	—	204.6	218.4	735,839	249,080
Aug 1981	—	208.0	222.6	722,684	245,817
Sep 1981	43.28	211.6	224.6	724,604	251,502
Oct 1981	—	213.4	227.0	717,918	248,159
Nov 1981	—	214.8	229.4	720,255	253,044
Dec 1981	44.52	216.3	230.4	709,612	257,655
Jan 1982	—	217.6	233.1	700,375	257,173
Feb 1982	—	220.2	236.8	705,992	250,191
Mar 1982	45.49	225.2	237.4	725,700	262,210
Apr 1982	—	228.9	241.9	707,502	252,562
May 1982	—	230.3	244.8	715,162	258,770
Jun 1982	45.77	232.1	246.7	707,552	261,361
Jul 1982	—	234.1	249.4	702,141	283,248
Aug 1982	—	236.8	253.4	—	—
Sep 1982	48.04	241.0	255.0	—	—

[1]Chamber of Mines of South Africa, Johannesburg; "Analysis of Working Results," published quarterly.
[2]Republic of South Africa Department of Statistics, Pretoria; "Government Gazette: Consumer Price Index for Urban Areas."
[3]Historical data for the Average Declared Working Costs and Consumer Price Index 1970-1979 appear on page 4.9 of Nuexco Report 140.
[4]April 1970 = 100.00.
[5]Previously known as the WHOLESALE PRICE INDEX, now the PRODUCER PRICE INDEX. The computation remains the same.
[6]Historical data for Codes 35 and 40 1977-1980 appear on page 28 of Nuexco Report 157.
[7]Bulletin of Statistics, Department of Statistics, Pretoria.

© NUEXCO 1982

NUEXCO

STATISTICAL DATA

US GOVERNMENT STATISTICS

	Producer Price Index—Industrial Commodities (1967 = 100)[1]	Producer Price Index—All Commodities (1967 = 100)[1]	Consumer Price Index (1967 = 100)[2]	GNP Implicit Price Deflator (1972 = 100)[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
					Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
Annual Avg. 1971[5]	114.1	114.0	121.3	96.01R	4.12	4.15	3.97	3.49
Annual Avg. 1972[5]	117.9	119.1	125.3	100.00	4.56	4.59	4.26	3.71
Annual Avg. 1973[5]	125.9	134.7	133.1	105.75R	4.84	4.98	4.51	3.91
Annual Avg. 1974[5]	153.8	160.1	147.7	115.08R	5.44	5.63	4.88	4.21
Annual Avg. 1975[5]	171.5	174.9	161.2	125.79R	6.13	6.24	5.39	4.64
Annual Avg. 1976[5]	182.4	183.0	170.5	132.34R	6.76	6.87	5.91	4.96
Annual Avg. 1977[5]	195.1	194.2	181.5	140.05R	7.28	7.67	6.43	5.39
Annual Avg. 1978[5]	209.4	209.3	195.4	150.42R	8.23	8.56	7.02	5.82
Annual Avg. 1979[5]	236.5	235.6	217.4	163.42R	9.27	9.50	7.60	6.32
Annual Avg. 1980[5]	274.8	268.8	246.8	178.64R	10.26	10.63	8.30	6.94
Annual Avg. 1981	304.1	293.4	272.4	195.51R	11.55	11.98	9.12	7.62
Sep 1981	307.4	295.7	279.3	197.36R	12.10	12.70	9.38	7.75
Oct 1981	309.0	296.1	279.9	—	12.08	12.44	9.37	7.80
Nov 1981	309.3	295.5R	280.7	—	12.12	12.48	9.42	7.83
Dec 1981	310.0	295.8	281.5	201.55R	12.08	12.45	9.53	7.90
Jan 1982	311.7R	298.2R	282.5	—	12.19	12.66	9.68	7.98R
Feb 1982	311.4R	298.5R	283.4	—	12.22	12.61	9.68	7.96R
Mar 1982	311.0	298.0	283.1	203.68	12.29	12.69	9.71	8.01
Apr 1982	309.9	298.0	284.3	—	12.23	12.68	9.81	8.03
May 1982	309.6R	298.6	287.1	—	12.25	12.71	9.83	8.05
Jun 1982	310.7P	299.4P	290.6	205.98	12.26	12.91	9.95	8.09
Jul 1982	313.0P	300.6P	292.2	—	12.23R	12.91R	10.02R	8.18
Aug 1982	313.4P	300.4P	292.8	—	12.28P	12.97P	10.01P	8.24R
Sep 1982	312.9P	299.5P	293.3	208.71	—	—	10.20P	8.32P

P = Preliminary R = Revised since last month

[1]US Bureau of Labor Statistics, Washington, D.C.; "Producer Prices and Price Indexes," Table 6 (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents.

[2]US Bureau of Labor Statistics, Washington, D.C.; Consumer Price Index for All Urban Consumers, US City Average, All Items.

[3]US Department of Commerce, Washington, D.C.; Bureau of Economic Analysis, National Income and Wealth Division; "Survey of Current Business," Table A. The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted.

[4]US Bureau of Labor Statistics, Washington, D.C.; "Employment and Earnings," Table C-2. All data based on 1972 revision of SIC Manual. Data for 1970-1976 are adjusted to the March 1977 benchmark. Data for 1977-1978 are adjusted to the March 1979 benchmark. Data for January 1979 and beyond are adjusted to the March 1980 benchmark.

[5]Monthly data 1970-1978 for Producer Price Index-Industrial Commodities, Consumer Price Index, and Employment and Earnings SIC codes 10, 333, and 28, and quarterly data for GNP Implicit Price Deflator appear on pages 4.6-4.8 of Nuexco Report 139.
Monthly data 1977-1978 for Employment and Earnings SIC Codes 10, 333, and 28 appear on page 33 of Nuexco Report 147.
Monthly data 1970-1978 for Employment and Earnings SIC Code 36 appear on page 23 of Nuexco Report 154.
Monthly data 1979-1980 for Employment and Earnings, Revised Establishment Data, all listed codes, appear on page 22 of Nuexco Report 158.
Monthly data 1977-1980 for Producer Price Index-All Commodities, appear on page 21 of Nuexco Report 158.

© NUEXCO 1982

INDEX

Report 170	Page
Canada — US embargo threat causes concern	2
Europe — Uranium Institute annual symposium—speeches excerpted	3
Market Analysis — VTAO: Its effect on uranium consumption	20
Raw Materials — Uranium occurrences in Norway	23
South Africa — Rand Mines Chairman's remarks to shareholders	2
United States — Five licenses issued so far in 1982	9
— Commentary: US Uranium Import Embargo Issue	15
— Essay: Future of US Uranium Production Industry	17
— Market Analysis: US Inventory Composition	19
West Germany — Utilities face stricter new emissions standard	2

OPTIMUM TAILS ASSAY

OPTIMUM TAILS ASSAY FOR VARIOUS COMBINATIONS OF FEED AND SWU COSTS

(percent U_{235})

Feed Cost (US$ per KgU as Natural UF_6)	SWU Price (US $ per SWU)																
	90	95	100	105	110	115	120	125	130	138.65	140	149.85	160	170	180	190	200
40	.316	.322	.327	.333	.338	.343	.347	.352	.356	.363	.364	.372	.379	.385	.391	.397	.402
45	.302	.308	.314	.320	.325	.330	.334	.339	.343	.350	.351	.359	.366	.373	.379	.384	.390
50	.291	.297	.302	.308	.313	.318	.323	.327	.332	.339	.340	.347	.354	.361	.367	.373	.379
55	.280	.286	.292	.297	.302	.307	.312	.317	.321	.328	.329	.337	.344	.351	.357	.363	.368
60	.271	.277	.282	.288	.293	.298	.302	.307	.311	.319	.320	.327	.334	.341	.347	.353	.359
65	.262	.268	.273	.279	.284	.289	.294	.298	.302	.310	.311	.318	.326	.332	.339	.345	.350
70	.254	.260	.265	.271	.276	.281	.285	.290	.294	.301	.302	.310	.317	.324	.330	.336	.342
80	.239	.245	.251	.256	.261	.266	.271	.275	.279	.287	.288	.295	.302	.309	.316	.322	.327
90	.227	.232	.238	.243	.248	.253	.258	.262	.266	.274	.275	.282	.289	.296	.302	.308	.314
100	.216	.221	.227	.232	.237	.242	.246	.251	.255	.262	.263	.270	.278	.284	.291	.297	.302

© NUEXCO 1982

NUEXCO

STAFF, REPRESENTATIVES AND CONSULTANTS

MENLO PARK, CALIFORNIA

J. Robert Wolcott
Chairman

George White, Jr.
President

Mathias M. Klingler
Chief Financial Officer

Richard K. Andersen, V.P.

Sanford C. Anderson, V.P.

Thomas A. Boyden, V.P.

Wayne D. Fowler, V.P.

R. Wesley Miller, V.P.

M. Jerry Reaves, V.P.

Robert J. Alexander

Judith L. Sellers

Kim M. Peyton

NEW YORK CITY

Kenneth R. McCue, V.P.

W. Scott Hickman

Teresa Elms Lindsay

EUROPE

James E. Vaughan, V.P.

France Millet Hamilton

Kathryn K. Bowen

REPRESENTATIVES AND PERSONNEL OF OVERSEAS REPRESENTATIVES

Peter R. Stork
Australia

Kazy Yokota
Japan

Chris I. Von Christierson
South Africa/Namibia

Edward Bee
Taiwan

Joe L. Hixon
United States

Harold C. Lindberg
United States

W. Hardy Prentice
United States

SPECIAL CONSULTANTS

Raymond C. Freeman
Santa Barbara, California

S.K. Pyo
Seoul, Korea

Elias Sefchovich
San Jose, California

W. Bryan Webster
San Jose, California

T.C. Wu
Hong Kong

BEST AVAILABLE COPY

B6800-1 12/14/82

/

NUEXCO

DECEMBER 1982 NUMBER 172

Monthly Report on the Nuclear Fuel Market

BEST AVAILABLE COPY

NUEXCO • 3000 Sand Hill Road • Menlo Park, California • 94025

NUEXCO

HEADQUARTERS

Building 3, Suite 290
3000 Sand Hill Road
Menlo Park, California 94025
Telephone: 415-854-1510
Telecopy: 415-854-2115
Telex: 470674 NUEXCO UI
TWX: 910-373-1760 NUEXCO MNPK

NEW YORK CITY

450 Avenue of the Americas, Suite 2A
New York, New York 10011
Telephone: 212-254-3010
Telex: 662018 Answerback: NUEXCO NYK

EUROPE

13 chemin du Levant
01210 Ferney-Voltaire
France
Telephone: (33)(50) 428035
Telecopy: (33)(50) 428526
Telex: 842-385878 Answerback SODIPF

23 Bramerton Street
London SW3 5JS
England
Telephone: (44-1) 351-2788
Telex: 266704 Answerback FMHLDN

U.S. REPRESENTATIVES

Harold C. Lindberg*

83-A Hardee Lane
Whispering Pines, N.C. 28327
Telephone: 919-949-3622

Joe L. Hixon*

302 Lombardy
Sugarland, Texas 77478
Telephone: 713-494-3802

W. Hardy Prentice*

11644 Harborview Drive
Cleveland, Ohio 44102
Telephone: 216-631-2350

OVERSEAS REPRESENTATIVES

Nuexcoafrica

c/o Southern Prospecting (Pty) Limited*
P.O. Box 61409
Marshalltown 2107
Republic of South Africa
Telephone: Johannesburg 838-1868
Telex: 8-9878 Answerback: 8-9878 SA

Nuexcoaustralia

c/o Oratom Consulting*
P.O. Box 70
7 Cliff Street
Milson's Point
NSW 2061, Australia
Telephone: (02) 929-6999
Telex: 73303 Answerback: ORATOM AA73303

Nuexcojapan

c/o Japan Tech Services*
Ohkura Building (3F)
1-4-10 Shiba Daimon
Minato-Ku, Tokyo, Japan
Telephone: 431-6031, 6025
Telex: 5060 Answerback: JATECH-J

Nuexcotaiwan

c/o Bee & Liang Company, Limited*
8-G FL Jen AE Mansion
NOK 37 Jen A1 Road Sec. 4
P.O. Box 1396
Taipei, Taiwan 106
Telephone: 02-721-2117
TWX: 785-11570 Answerback: 11570 BEELIANG

* Independent contractors representing Nuexco

BEST AVAILABLE COPY

NUEXCO REPORT 172
EXECUTIVE SUMMARY

Exchange Value Jumped $2.25, to $19.75

The **Exchange Value** as of November 30, 1982 is **$19.75** per pound U_3O_8. The 13% rise is the second largest percentage increase in history. Nine uranium sales are reported, involving a total of 10 million pounds U_3O_8 equivalent. Four long-term deals accounted for 80% of the total.

Near-term Supply and Demand in Balance. Ratio is 1:1.

Active sellers in the zero to one year time frame are offering 5.2 million pounds U_3O_8, up 20% from 4.3 million pounds last month. Even after spot and near-term transactions representing two million pounds were concluded during November, *active uranium demand* jumped to 5.2 million pounds U_3O_8 as of the end of the month, more than double last month's level of 2.1 million. The ratio of near-term supply to near-term demand dropped to 1.0:1 this month, less than half of last month's ratio of 2.1:1.

Transaction Value Increased $0.55, to $17.55

The **Transaction Value** as of November 30, 1982, is **$17.55** per pound U_3O_8. It includes 20 transactions totaling 4.9 million pounds U_3O_8 and covers a period of three months.

Conversion Value Dropped 15 Cents, to $1.45

The **Conversion Value** as of November 30, 1982, is **$1.45** per pound U as UF_6, down fifteen cents from last month. No conversion transactions are reported. Active sellers are offering 2.9 million pounds U as UF_6 in near-term conversion services, up 1.2 million pounds since last month. Active demand rose to 1.6 million pounds U as UF_6, five times last month's level. The increase was due to the entry of one more buyer.

Loan Use Charge Rate Steady at 6%

The **Loan Use Charge Rate** as of November 30, 1982, is **6 percent** per annum. One small transaction is reported.

Enriched Uranium and SWUs

Secondary market sellers of DOE SWU for FY 1983 deliveries continued to offer discounts of about $25 per SWU from DOE's AFC price (calculated at .2 tails). Eurodif sellers are offering substantially larger discounts from DOE's AFC price, in the range of $35 per SWU (at .2 tails). Sellers of DOE SWU for delivery in FY 84 continue to offer discounts of $28-$30 from DOE's AFC price (at .2 tails). Offers from Eurodif sellers are made in terms of a base price plus escalation, so they are not directly comparable to those of DOE sellers, because DOE's AFC price for FY 84 delivery is not yet known.

The Impact of the FR Contract on the Secondary SWU Market

In the long term, firm commitments to DOE will diminish. There will also be very little excess SWU, so the traditional secondary market activity will be reduced substantially, but it could be replaced by sales of Eurodif SWUs to holders of DOE requirements contracts having 3.5 year termination provisions.

Australia

Inflation and high unemployment are causing the governing Liberal party to lose popularity in Australia.

Canada

SMDC has obtained Canadian government approval for seven contracts covering a total of 14.5 million pounds U_3O_8.

Germany, Federal Republic

West German utilities are hopeful that the "Konvoy" system can facilitate the licensing of the next round of German power reactors.

Japan

Utilities are expected to demand sharply reduced prices in the upcoming round of annual negotiations with their principal uranium suppliers.

Raw Materials

Describes Marline Uranium's Swanson orebody.

United States

The proposed uranium import embargo was rejected by the House of Representatives.

The NRC issued two full-power operating licenses and one fuel loading and low power license.

Analysis and Commentary

Excerpts of Wayne Fowler's Taipei speech are presented.

Nuexco's latest forecasts of WOCA uranium production are presented. Substantial declines in the US are to be offset only partially by increases in Australia and Canada.

This Executive Summary may be reproduced for internal distribution

TELEPHONE: (415) 854-1510 TWX: 910-373-1760 TELEX: 470674